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Global Perspectives on Resilience in Children and Youth

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Global concerns about the consequences of disasters, political violence, disease, malnutrition, maltreatment, and other threats to human development and well-being have sparked a surge of international interest in resilience science. This article highlights progress and issues in research that aims to understand variations in human adaptation to adverse experiences. Two key questions are considered: Why is a new wave of global research on resilience important for developmental science? and Why is developmental science important for global resilience? The conclusion calls for developmental scientists to engage in international efforts to promote resilience.

The development of children around the world is threatened by disasters, political violence, pandemics, and other adversities that can have life-altering consequences for individuals, families, and the future of all societies. The beginning of the 21st century was punctuated by a terrifying sequence of events affecting large numbers of victims across the world. These include 9/11 and subsequent terror attacks, Hurricanes Katrina and Sandy, the 2004 tsunami in the Indian Ocean triggered by one of the largest earthquakes in human history, the BP Oil Spill in the Gulf of Mexico, the 2008 earthquake in China, HIN1 flu, and the triple disaster of 2011 in Japan of earthquake, tsunami, and meltdown of the Fukushima Daiichi nuclear power plant. Reports from the United Nations (UN) indicate that tens of millions of children each year are exposed to disasters and conflicts, and many are displaced as a result (UNHCR, 2010; UNICEF, 2011, 2012). Millions more suffer abuse or neglect from caregivers (Cicchetti, 2013b) and sex trafficking or other forms of exploitation (Hartjen & Priyadarsini, 2012).

These well-publicized adversities have raised global concerns about dangers posed to children as well as the future of societies, while also highlighting a lack of preparedness to handle such calamities. These concerns have spurred renewed attention to *resilience* across many fields of research as governments and international agencies search for evidence and guidance on what helps to mitigate risk and promote resistance or recovery in the face of these threats to human life. Developmental science is well positioned to contribute to and benefit from a more integrated and global science of resilience.

In this article, I invite the reader to consider two related questions: Why is a new wave of global research on resilience important for developmental science? and Why is developmental science important for global resilience? A brief history of resilience research in child development is highlighted first, including major accomplishments and critiques. Subsequently, I describe the maturation of developmental resilience science, progress toward a global knowledge base on resilience in children and youth, and enduring controversies. The conclusion offers some preliminary answers to the two questions, describes signs of globalization in the Society for Research in Child Development (SRCD), and issues a call to action for developmental scientists.

Conceptual Origins

Resilience can be broadly defined as the capacity of a dynamic system to adapt successfully to disturbances that threaten system function, viability, or development. The concept can be applied to systems of many kinds at many interacting levels, both living and nonliving, such as a microorganism, a child, a family, a security system, an economy, a forest, or the global climate. Interest in resilience as a concept and observable phenomenon emerged around the same time but independently in the

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fields of ecology (e.g., Holling, 1973) and psychology (e.g., Garmezy, 1971; Murphy & Moriarty, 1976). Both areas of science, as well as many others, were influenced by general systems theory (von Bertalanffy, 1968).

The word itself has roots in the Latin verb, *resilire* (to rebound). The concept has been adopted by many fields concerned with how well complex systems anticipate, adapt, recover, and learn in the context of major threats, surprises, and disasters(e.g., Gunderson, Allen, & Holling, 2010; Hollnagel, Woods, & Leveson, 2006; Zolli & Healy, 2012). Social scientists intrigued with understanding how some people escape the harmful effects of severe adversity, cope well, bounce back, or even thrive, eventually settled on this word to label the focus of their research.

Resilience research in developmental science has deep roots in research and theory in child development, clinical sciences, and the study of individual differences (Luthar, 2006; Masten, 2013). The history of research on resilience is closely tied to the history of developmental psychopathology (see Cicchetti, 2013a; Masten, 2013) and the relational developmental systems theory that infuses this integrative approach to understanding variations in human adaptation over the life course (Lerner et al., 2012; Overton, 2013; Sameroff, 2000).

The Emergence of Resilience Research in Child Development

World War II (WWII) set the stage for the emergence of resilience science, bringing worldwide attention to the plight of children affected by the devastation (Werner, 2000). Many children died and millions more survived in perilous condition: orphaned, injured, sick, traumatized, and starving. Huge numbers of children were evacuated or displaced. Shortly after the war ended, the United Nations International Children's Emergency Fund (UNICEF) was founded to address this global emergency (Diers, 2013), and "CARE" was organized in the United States to send aid to Europe (initially the Cooperative for American Remittances to Europe; later the Cooperative for Assistance and Relief Everywhere), sending millions of CARE packages to Europe, often addressed simply, "For a hungry person in Europe" (Werner, 2000).

Clinicians from different disciplines were called on to help with children psychologically affected by the war, including Anna Freud, who founded the Hampstead War Nurseries in England for children in need of care. Freud and Burlingham (1943) published a volume on their observations, *War and Children,* where they noted that children rarely showed "traumatic shock" when a parent was present and also that caregivers' reactions were important for children's reactions. A few systematic studies were done of children during WWII, but research was limited by scarce resources and the exigencies of war itself (Garmezy, 1983).

A rather different legacy of WWII was its effects on the lives of individuals who would become pioneers in resilience science. For example, Norman Garmezy (1985; Garmezy & Rutter, 1983) was a young American soldier who served in the infantry in Europe, observing the Battle of the Bulge firsthand. Emmy Werner (Werner & Smith, 1982) survived the devastation of Europe as a young girl, directly experiencing the support of international relief efforts. Michael Rutter (1979, 1987) was one of the British children evacuated to safety in the United States during the war. These three would play leading roles in the rise of resilience science.

As research on mental health expanded after WWII, investigators identified risk factors associated with elevated probabilities for various disorders and problems. In childhood, maltreatment, violence, and traumatic life events were often studied by risk researchers because they were common and consistently associated with high risk for psychopathology. Research on high-risk children soon revealed wide variation in outcomes and inspired research on children who were doing well despite adversity or risk (Cicchetti, 2013a; Evans, Li, & Whipple, 2013; Masten, 2013).

Disasters also played a key role in early research on risk and resilience (Masten & Narayan, 2012). One occurred in Buffalo Creek, West Virginia, in 1972, when a coal slurry impoundment dam gave way, flooding and destroying the community below and killing 125. Ensuing litigation yielded extensive longitudinal data on effects of this disaster on children and adults (e.g., Gleser, Green, & Winget, 1981; Korol, Kramer, Grace, & Green, 2002). Despite concerns about potential bias in data obtained for lawsuits, numerous findings were replicated in subsequent research on mass-trauma events (Masten & Narayan, 2012). Children and adults showed dose-response gradients, for example, with more symptoms among individuals exposed to greater destruction, injury, and loss. Seventeen years later, dose effects were largely gone, although some trauma symptoms lingered; recovery and resilience appeared to be the norm (Green et al., 1994; Korol et al., 2002).

A disaster on the other side of the world, the Australian Bushfire of 1983, also provided remark-

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able documentation of short- and long-term effects of disaster on children. McFarlane (1987; McFarlane & Van Hooff, 2009) compared symptoms among a large cohort of fire-exposed school children with students from schools outside the directly exposed region, both shortly after the fire and 20 years later. Again, dose mattered and early effects largely dissipated over the long term. This classic study also found that separation of children from caregivers was a critical predictor of how fire-exposed children fared, and proximity of attachment figures during life-threatening adversities had protective effects, as observed during WWII.

In 1987, Michael Rutter published a landmark paper, still the most cited journal article on psychosocial resilience in the literature, that summed up much of the first-generation research, delineated key issues, and set the stage for ensuing waves of resilience science (Masten, 2012; Rutter, 1987). Rutter described resilience in terms of processes and turning points, provided many examples of interaction effects, and noted evidence of "steeling effects," where engagement with stress served to prepare the individual for better subsequent adaptation.

Accomplishments and Critiques of Early Resilience Science

Rutter's classic article and other early reviews documented the accomplishments of the first wave of resilience science, including models, methods, and a body of findings (e.g., Garmezy, 1985; Masten, Best, & Garmezy, 1990). Despite notable consistencies in the findings, shortcomings in the evidence base became evident and controversies began emerging.

Models and Methods

Early investigators established models and methods for research on resilience that continue to be useful, although refinements inevitably were needed, particularly with respect to cultural and contextual issues. Resilience research requires strategies for assessing risk or adversity, adaptation, and other influences that might explain variations in adaptation among children at risk, and statistical methods for testing models or hypotheses about the interplay among these possible contributors to resilience. Investigators soon recognized that single risk indicators did not reflect the reality of adversity exposure in children, who were often exposed to multiple risk factors or adversities. Various measures were designed to index cumulative risk or adversity exposure (see Evans et al., 2013; Obradović, Shaffer, & Masten, 2012). In disaster studies, for example, exposure to death and destruction might be indexed by proximity to the epicenter of devastation or by counts of traumatic experiences.

Various approaches were taken to defining adaptation as well. In some studies, adjustment was defined by the *absence* of psychopathology or other expected negative outcomes that defined the risk group of interest. In other cases, adaptation was evaluated on the basis of positive achievements in age-salient *developmental tasks*, the psychosocial or physical milestones and accomplishments expected for individuals in a given period of development in a given sociocultural context (McCormick, Kuo, & Masten, 2011). Some of these tasks were viewed as universal, such as learning to walk or talk; others were common across developed nations, such as learning to read; still others were more specific to a culture or context, such as learning to weave textiles, fish, or master sacred texts.

Early models included linear and nonlinear effects linking adversity to adaptation (e.g., Masten et al., 1988). Nonlinear effects included exponential increases in problematic outcomes as risk or adversity levels increased or curvilinear effects where adaptation improved at lower levels of challenge and then fell at higher levels ("the challenge model"), analogous to the Yerkes-Dodson inverted-U relation of performance to arousal. Additional positive explanatory factors or influences were added to these models to explain positive outcomes. When they had the same effects across levels of risk (a main effect in statistical models), they were conceptualized as assets, resources, or compensatory factors (later termed "promotive factors" by Sameroff, 2000). When there was an added or special effect when risk or adversity was high, they were described as "protective factors" that moderated risk effects (interaction effects).

Investigators developed two basic approaches to identifying and testing the resources and protective factors associated with resilience: person focused and variable focused (Masten, 2001). The former included case studies and research on groups of individuals who met specified criteria for both risk and good adaptation, typically to compare them with other groups of people who shared the same level of risk but were maladaptive, and sometimes also to others who shared the same positive outcomes but had lower risk. Variable-focused approaches typically used multivariate statistics, such as hierarchical regressions, to test main effects and moderators.

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Early Findings and Critiques

Early findings indicated key differences associated with good adaptation compared to maladaptation among high-risk groups of children. There was enough consistency that early reviewers (e.g., Garmezy, 1985) could summarize them in terms of child attributes (individual differences), family attributes (e.g., socioeconomic variation, parenting), and extrafamilial differences (e.g., neighborhood, school, mentors outside the family). Complexities emerged as well, including data congruent with Rutter's (1987) admonition that protective effects had to be considered in terms of function and context, and not as inherent to the "protective factor" itself. One example heralding the importance of context was a study of temperament by deVries (1984) that Rutter (1989) used to illustrate this issue. At that time, developmental scientists tended to assume (as implied by the labels) that "easy" babies who had more mellow temperaments were more adaptive than "difficult" or "fussy" babies viewed as more challenging and demanding. In the deVries study, temperament was measured in Masai infants using a measure originally developed for North American children. After a severe drought, the investigator found, to his surprise, that difficult infants survived the harsh conditions better than easy babies. Masai culture may have played a part in these results, with multiple family members in caregiver roles, feeding offered on demand, and a high value on assertiveness.

Some reviewers emphasized that context was important (e.g., Masten et al., 1990; Rutter, 1990), yet on the whole the early resilience literature did not address context well nor consider important cultural variations in the meaning and measurement of resilience and culturally based protective influences. Criteria for judging good adaptation or success in developmental tasks were clearly culturally based, yet rarely examined in this light, even though scholars called for a more sociocultural approach (e.g., Oerter, 1986; Ogbu, 1981). Resilience studies were criticized for neglecting context in models and methods, and especially for the lack of research on culturally based protective factors (e.g., Luthar, Cicchetti, & Becker, 2000; Masten, 1999).

The Maturing of Resilience Science

In the quarter-century that followed the first wave of science and attendant reviews, human resilience science expanded and matured, becoming more global and multidisciplinary in scope. Advances in the measurement of genes and biological processes gave a boost to research on the neurobiology of resilience. Models, methods, and findings became more dynamic and more nuanced. Processes involving multiple levels of analysis took center stage. And finally, as international and multicultural research gained traction, global perspectives on resilience emerged and stimulated refinement of methods and theory. Key changes are highlighted here.

Complex Adaptive Systems

Over the decades since the science on resilience in children began, the conceptualization of the construct grew more dynamic (Masten, 2013; Schoon, 2012), reflecting a broader systems transformation in developmental science (e.g., Lerner et al., 2012; Zelazo, 2013). This relational developmental systems framework (Overton, 2013) integrated ideas from developmental systems theory (Lerner, 2006), ecological systems theory (Bronfenbrenner & Morris, 2006), family systems theory (Goldenberg & Goldenberg, 2013), biological systems (Lickliter, 2013), and developmental psychopathology (Cicchetti, 2013a). Contemporary systems models assume that many systems interact or "co-act" to shape the course of development, across levels of function, from the molecular to the macro-levels of physical and sociocultural ecologies. The resilience of an individual over the course of development depends on the function of complex adaptive systems that are continually interacting and transforming. As a result, the resilience of a person is always changing and the capacity for adaptation of an individual will be distributed across interacting systems.

I have previously suggested that many of the widely observed protective factors for individual resilience in children reflect adaptive systems shaped by biological and cultural evolution (Masten, 2001, 2007). These include close attachment relationships, reward systems and mastery motivation, intelligence and executive functions, and cultural belief systems and traditions in many forms, including religion. Each of these adaptive systems can be considered at various levels of analysis from multiple disciplinary perspectives, including anthropology, biology, ecology, economics, psychology, and sociology.

Multilevel dynamics (processes linking levels of function within and across systems) hold considerable interest in resilience theory. For example, there is great interest in processes by which adversity is

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biologically embedded and mitigated (e.g., Karatoreos & McEwen, 2013), violence at the community level influences family function and thereby cascades to affect children (e.g., Cummings et al., 2012), or good parenting influences the development of executive function skills in children at the neural and behavioral levels (e.g., Blair, Berry, Mills-Koonce, & Granger, 2013). Disasters underscore the interdependence of individual, family, and community systems, as well as biological, physical, and ecological systems across levels (Masten & Narayan, 2012). Large-scale disasters like Katrina or the 2011 tsunami in Japan challenge or destroy many adaptive systems simultaneously across large areas and groups of people. Consequently, recovery can take some time, and adequate preparation for disasters usually requires an integrated perspective with consideration of multiple, interdependent systems.

Trajectories and Pathways

Modeling dynamic change in complex systems is a challenge across many fields of research, and resilience science is no exception. Conceptually, these models and ideas are not new; Gottesman illustrated such models decades ago (e.g., Gottesman, 1974) and they have been important in the history of developmental psychopathology (e.g., Cicchetti, 2013a; Masten, 2006). However, progress in statistical methodology for modeling change within individuals over time and between-person differences in within-person change have opened new possibilities for studying pathways and trajectories in developmental science (Grimm, Ram, & Hamagami, 2011). Statistical and computing advances, in combination with repeated measures in longitudinal studies, have made it possible to begin testing pathway models and illustrating real trajectories of behavior over time in the context of acute or chronic adversities.

Theoretical pathway models of resilience in the context of acute and chronic adversity have been presented by a number of scholars in the resilience field (e.g., Masten & Narayan, 2012). These models illustrate different patterns of adaptive behavior over time in relation to onset of a traumatic experience or change in adversity level, often illustrating stress-resistance, a pattern with little or minor disturbance of function in response to an adverse experience (Bonanno & Diminich, 2013, term this pattern "minimal-impact resilience"), breakdown and recovery of function in response to a sudden overwhelming stressor (sometimes called a "recovery" pattern), and posttraumatic growth or improvement in function in response to adversity. In the case of chronic adversity, such as might occur with institutional rearing or child maltreatment, another pattern has been delineated, where function is poor or declining and then turns around when conditions improve, a pattern variously referred to as "normalization" (Masten & Obradović, 2008) or "emergent resilience" (Bonanno & Diminich, 2013). Some scholars also include the maladaptive patterns in their pathway figures, where breakdown or decreases in function occur in the aftermath of adversity followed by little or no recovery.

Growth curve modeling and group-based trajectory modeling techniques (Grimm et al., 2011; Nagin, 2005) have made it possible to study patterns of change over time in individuals and test for hypothesized response patterns. Longitudinal studies with repeated measures are rare; however, there are some recent examples of research on trajectories in children. Betancourt, McBain, Newnham, and Brennan (2013), using latent class growth curve analysis, identified four trajectories of internalizing symptoms over time in a sample of child soldiers and other youth from Sierra Leone with extremely high trauma exposure: a stress-resistance (minimal-impact resilience) pattern with steady, low internalizing symptoms (41% showed this pattern), a recovery pattern with substantial improvement over time in symptoms (47%; presoldier measures were not available), persisting symptoms (5%), and a deteriorating pattern of worsening symptoms (6%). Another study of trajectories utilized data from a study of 568 children followed after Hurricane Andrew (La Greca et al., 2013) and latent growth mixture modeling to identify three trajectories based on measures at 3, 7, and 10 months posthurricane: (minimal-impact) resilient (37%), recovering (43%), and persistently distressed (20%). Both these studies offer support for several predicted trajectories, including resilience pathways and persisting effects, while also corroborating the observation that the majority of children, even after severe acute or chronic adversities, show resilience in some form.

The Neurobiology of Resilience

Research on the neurobiology of resilience has surged with advances in methodology that make it possible to measure genes and epigenetic change, examine the status of stress-response systems and immune system function, and see the brain in

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action through various imaging techniques (Cicchetti, 2013a, 2013b; Hughes, 2012; Karatoreos & McEwen, 2013; Kim-Cohen & Turkewitz, 2012; Masten, 2013; Russo, Murrough, Han, Charney, & Nestler, 2012). Some of these techniques can only be utilized in the context of laboratories; however, some are "field friendly," making it possible to assess biomarkers of stress or adaptation processes in authentic ecological settings and even in the midst of disaster recovery experiences. DNA, salivary cortisol, and blood spots, for example, have been collected in remote and high-stress contexts, including trailer parks set up after Hurricane Katrina (e.g., Vigil, Geary, Granger, & Flinn, 2010), homeless shelters (e.g., Cutuli, Wiik, Herbers, Gunnar, & Masten, 2010), foster homes (e.g., Fisher, Van Ryzin, & Gunnar, 2011), treatment centers for maltreated children and their families (e.g., Cicchetti, 2013a, 2013b), home visits with low-income and rural families (e.g., Blair et al., 2013), and field sites around the world in which anthropologists are including biomarker assessments along with their more traditional measures (McDade, Williams, & Snodgrass, 2007; Worthman & Costello, 2009; Worthman & Panter-Brick, 2008).

Research conducted with diverse samples of children from developing and developed nations plays an important role in the neurobiological wave of research on risk and resilience. For example, cortisol from hair sampling has been examined in girls with various levels of exposure to the 2008 devastating Wenchuan earthquake in China (Luo et al., 2012). Cortisol measured from hair samples is a potential biomarker that provides a "timeline" of stress responses embedded in the hair as it grows. Results show exposure effects, with cortisol levels elevated in girls who were more exposed. In addition, girls with posttraumatic stress disorder (PTSD) showed different patterns and lower cortisol than exposed girls who did not have PTSD.

Research on cortisol using various assessment methodologies in diverse contexts of adversity has yielded a complex picture of how the stress regulation systems may be affected by trauma experiences over the life course and over generations (Gunnar & Herrera, 2013; Matthews & Phillips, 2012). For reasons not yet clear, either elevated or reduced cortisol levels or reactivity can be found after adversity. Exposure timing may play a role, and there is considerable interest in prenatal programming effects, presumably epigenetically mediated, in response to trauma exposure of mothers. Yehuda and colleagues, for example, have studied cortisol in the children of survivors of the Holocaust and 9/11, observing lower cortisol levels among mothers who developed PTSD and their offspring (see Yehuda et al., 2010). Greater effects were found with 9/11 exposure in the third trimester.

Developmental Timing

There is growing international interest in timing effects of physical and psychological stressors on human development. Some of this research stems from WWII, including the studies of radiation exposure on children after the atomic bombing of Japan and the "Dutch Famine" studies. Research on radiation exposures in children after the atomic bombs were dropped on Japan and more recently from the radiation leaks after the explosion of the Chernobyl nuclear plant shows clear timing effects (Fushiki, 2013); worse effects are observed with fetal exposure during organogenesis, and the central nervous system is particularly sensitive during weeks 8–25. Similarly, studies of children who experienced the famine during the occupation of the Netherlands in the winter of 1944–1945 also show differential timing effects on the life-long health of surviving children (e.g., Painter, Roseboom, & Bleker, 2005).

Another study of Chernobyl indicated timing effects focused on psychological stress rather than radiation, drawing data from a national twin study underway at the time in Finland. The known timing of Chernobyl (in 1986) made it possible to design a natural experiment to compare adolescent twins who were in gestation during this incident with a cohort of twins conceived a year later, after the worst fears about radiation had dissipated (Huizink et al., 2008). Results indicated biological differences in hormones not attributable to radiation exposure. For example, salivary cortisol levels were higher among adolescent offspring of mothers pregnant during Chernobyl, and timing suggested greater vulnerability during the second trimester.

Developmental timing has been implicated for protective processes as well as vulnerability. There is growing interest in delineating the processes by which adaptive systems "learn" or are "tuned" to the expected environment, to be effective for the organism in context. Evidence supporting the "hygiene hypothesis" for the rising prevalence of asthma, allergies, and related immune dysfunctions in modern societies provides an example of the benefits of early exposure to microorganisms for calibrating the immune system (Okada, Kuhn, Feillet, & Bach, 2010). For instance, growing up on a farm is protective for respiratory allergy (von Mutius & Radon, 2008). Timing is important as the

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same type of exposures coming too late can trigger problems.

There is great interest in identifying sensitive periods for additional adaptive systems and processes because of the profound implications for policy, prevention, and practice. There may well be windows of opportunity and plasticity when adaptive systems can be promoted (or protected from harm) to favor resilience; these windows could point to targets and timing of interventions or prevention efforts that would have a high return on investment or greater effectiveness (Masten, 2011). For example, research on international adoption as an intervention to improve the rearing context suggests that children adopted at younger ages from institutions to homes with good care-giving fare better than later adopted children (Gunnar & Herrera, 2013). The emerging work on prenatal stress effects on the fetus suggests that stress-regulation systems may also be sensitive to interventions that protect and support mothers during pregnancy.

The research on programming effects during sensitive periods has raised the possibility of reprogramming adaptive systems as a strategy of intervention, or reopening windows of plasticity (Meaney, 2010). Growing knowledge of epigenetic change and gene expression in mature animals is opening new horizons for intervention, and also may recast the questions of sensitization versus steeling effects in resilience science.

Resilience (At Last!) in Cultural Context

Serious attention to culture in resilience research was long overdue. During the early decades of resilience science, theory and data considering resilience in cultural context were limited (Luthar, 2006; Ungar, Ghazinour, & Richter, 2013; Wachs & Rahman, 2013; Wright, Masten, & Narayan, 2013). In the past two decades, research on the role of culture in resilience finally began to flourish. Numerous books and conferences have focused on the social ecologies of resilience and there are more cross-cultural and multicultural studies. There is greater attention to cultural practices, including religion, that may foster resilience in individuals and communities (see Ungar, 2012). The World Bank published a review of the international evidence on risk and resilience related to the global economic crisis (Lundberg & Wuermli, 2012). Studies of migration and acculturation flourished (see Masten, Liebkind, & Hernandez, 2012), addressing issues like the "immigrant paradox," when first-generation youth show better health or adjustment than subsequent generations (Garcia Coll & Marks, 2012). Research on children in war and disasters expanded, often focused on resilience (Masten & Narayan, 2012).

Ungar (2011) proposed a social ecological model of resilience that highlights the role of culture and context. Ungar and colleagues founded the Resilience Centre at Dalhousie University, mobilizing a network of investigators across five continents to study resilience. Their work is yielding a rich body of qualitative and quantitative data that expands and challenges resilience theory (see Ungar, 2012; Ungar et al., 2013). In the Basotho community of South Africa, for example, investigators observed the importance of "Botho" (a philosophy similar to "Ubunto" in other African cultures that emphasize human interdependence) in young people identified as resilient (Theron, Theron, & Malindi, 2012). Resilient youth in Basotho were described as flexible and determined, common attributes reported in youth viewed as resilient in many cultures, but also as well connected to community support systems and respectful of community values important to their culture.

Investigators have documented cultural rituals that appear to play a powerful role in the acceptance and recovery of young people who are struggling to overcome adverse experiences, particularly when they have offended societal values or committed humanitarian atrocities under duress. In an article on "rethinking resilience from indigenous perspectives," Kirmayer, Dandeneau, Marshall, Phillips, and Williamson (2011) describe the ritual of reconciliation and forgiveness practiced by the indigenous people of Atlantic Canada, the Mi'kmaq, to resolve offenses and settle conflicts. Rituals of cleansing and forgiveness also appear to be important in the reintegration and recovery of child soldiers in African cultures (e.g., Boothby, Crawford, & Halperin, 2006).

For young people who face racial or ethnic discrimination, there is increasing research on protective strategies that foster resilience, both naturally occurring and through interventions (Evans et al., 2012; Hughes et al., 2006; Serafica & Vargas, 2006). Research indicates strategies used by parents and families in their racial/ethnic socialization to convey pride in racial/ethnic heritage while also training children to deal with prejudice, the dangers of discrimination, and barriers to opportunity. Sirin and colleagues (Sirin & Gupta, 2012) have studied successful adaptation in Muslim-American youth in the aftermath of 9/11, a difficult period for Muslim immigrant families in the United States, with a

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focus on the success of young people who reside happily "on the hyphen," effectively navigating their bicultural contexts. At the same time, there is growing recognition of the corrosive effects of discrimination on development and the importance of a social justice agenda directed at changing the context rather than expecting a child to adapt to injustice (Fisher, Busch-Rossnagel, Jopp, & Brown, 2012; Ungar et al., 2013).

Investigators focused on understanding risk and resilience in cultural context have taken research into very challenging environments. The work of Panter-Brick and Eggerman (Eggerman & Panter-Brick, 2010; Panter-Brick, Goodman, Tol, & Eggerman, 2011) in Afghanistan offers an example from an extremely challenging research environment rife with ongoing political conflicts, dangers related to family and community violence, and economic distress. This team was able to conduct a school-based survey of mental health with over 1,000 students and their adult caregivers, supplemented by interviews and subsample follow-ups. Their methods included strategies to systematically glean ethnographic data for analysis, with open-ended questions about daily difficulties and solutions, as well as quantitative assessments. This group argues persuasively that values in the Afghan culture (faith, family unity, service, effort, morals, and honor) provide a sense of cohesion and meaning to life that plays a central role in resilience of Afghan families and their children.

Research in challenging contexts also includes studies of young people living in war zones or engaged in prolonged violent political conflicts. There is a growing and distinctive literature on youth engaged in ethnopolitical conflicts around the world that has required thoughtful attention to political and cultural issues (Barber, 2009; Cummings et al., 2012; Dimitry, 2012; Masten & Narayan, 2012). Numerous studies in the Middle East since 2000 have focused on youth engaged, often voluntarily, in violent situations such as the Palestinian–Israeli conflict that have complex cultural and political histories. For example, researchers have contrasted the political, socioeconomic, and cultural experiences of Palestinian, Israeli-Jewish, and Israeli-Arab children living in Gaza, the West Bank, and other regions of Israel as they study the effects of the conflict (Barber, 2009; Dimitry, 2012). Some findings are provocative. Youth in these conflicts appear to gain a sense of identity and agency through their engagement, despite the inherent dangers, underscoring the importance of context for understanding perceived meaning and roles in these conflicts.

In a rare, longitudinal study of multilevel dynamics, Boxer et al. (2013) examined spreading effects over time linking interethnic political violence at higher levels of social ecology to violence exposure in more proximal youth microsystems (community, family, school violence) to individual youth aggression. The study applied structural equation modeling to three waves of data collected over 3 years with Palestinian and Israeli youth who were 8, 11, and 14 years old. Results suggested cascading effects of violence across ecological contexts, from political system to microsystems to individuals, resulting in increases in individual violence.

Revisiting Four Enduring Controversies Through a Global Lens

Over the years, there have been persistent issues and controversies in resilience science (see Luthar, 2006; Masten, 2012, 2013; Panter-Brick & Leckman, 2013; Rutter, 1987). Many of these controversies involve considerations of context, including culture and nationality.

What Does Resilience Mean?

The meaning of resilience in developmental science has been a matter of some controversy for decades. Research on resilience requires operational definitions of risk, threat, or disturbances and adaptive outcomes or processes of interest. Defining positive adaptation involves implicit or explicit value judgments or criteria about desirable adaptation (see Masten, 2001). Such judgments are influenced by cultures of science, as well as sociocultural and historical context. Evolutionary biologists may be concerned with reproductive fitness of the population, while child psychologists may be focused on individual competence in age-salient developmental tasks. Global research on competence and resilience indicates both commonalities and variation in these criteria (McCormick et al., 2011; Ungar, 2012). Research in more diverse societies highlights the variation in interpreted meaning of similar experiences and the profound role of culture in shaping exposures, responses, and expectations of children in adversity (Eggerman & Panter-Brick, 2010; Masten & Narayan, 2012; Ungar et al., 2013).

Who Defines "Adaptive" or Doing Well?

A related controversy concerns the issue of *who* should define the meaning and measures of resil-

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ience in research. Should it be individually defined (e.g., perceived stress and well-being; tailored to the situation) or objectively defined by community or national or international standards? What kind of validation is meaningful for measures developed in one culture or context and applied to another? What about research on children who must adapt to multiple cultures and sets of expectations simultaneously (as is the case for many immigrant youth)? Wrestling with these questions is essential to global research on resilience.

Is There a Trait of Resilience?

This perennial issue should be put to rest (Masten, 2012; Panter-Brick & Leckman, 2013; Rutter, 1987). The answer is no. There are personality (or temperament) dimensions consistently associated with resilience, such as conscientiousness; however, there is evidence that experiences shape personality traits, that traits can influence exposure to adversity, and also that the same trait can function as a vulnerability or protective influence, depending on the domain of adaptation, the physical or sociocultural value and meaning of the trait, and the age or gender of the individual (Lengua & Wachs, 2012; Shiner & Masten, 2012). An inhibited adolescent, for example, may be at risk for social or emotional problems but protected from the dangers of risk-taking behaviors. Global research has played a significant role in addressing this issue, through findings that illustrate the range of capacities and values related to variations in the meaning and function of individual differences in temperament or personality across cultures and situations. In addition, growing theory and research on individual differences in sensitivity to experience, or differential susceptibility to the environment, underscore the role of context in moderating the influence of individual differences on adaptive function and development (e.g., Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007; Ellis & Boyce, 2011). In addition, such individual differences in temperament or "sensitivity" themselves appear to be developmentally influenced by experience and context.

Is There a Price to Pay for Resilience?

Another enduring issue in the study of resilience is the question of whether resilience takes a toll through the demands imposed by adapting well under high adversity. This issue takes two forms. One is the idea of scarring or lingering effects of experienced adversity on development, despite achieving good adaptive function in multiple ways, which might better be termed a price of adversity rather than resilience. A second kind of "price" explicitly refers to the toll of striving for resilience under extremely difficult conditions. There has been scattered evidence that some young people from very high-risk backgrounds showing resilience in developmental tasks suffer long-term health issues (e.g., Werner & Smith, 2001). This issue re-emerged in a study of allostatic load observed among youth in an intervention study (Brody et al., 2013), with the provocative title, "Is Resilience Only Skin Deep?" Young people with a track record of resilience from African American families showed high allostatic load (e.g., high body mass index and high blood pressure) in conjunction with the good psychosocial adjustment. Global perspectives may shed light on the contexts in which resilience exacts such a "toll."

Conclusion

Today, resilience research in child development reflects a broad transformation occurring in multiple sciences concerned with adaptation in complex developing systems. The concepts and empirical approaches are more dynamic, as investigators attempt to understand and promote adaptive change or the capacity for positive adaptation in a context of existing or potential threats and surprises. Efforts to prepare for global disasters and threats of diverse kinds appear to be motivating forces to integrate and share tools, concepts, and knowledge across fields to enhance the capacity for effective system responses to expected or unexpected threats. There are efforts to create common concepts and tools that will facilitate building a more integrated, scalable, multidisciplinary science of resilience to address issues of global concern (Brown, 2013; Gunderson & Holling, 2002; Masten & Obradović, 2008; Welsh, 2013). Intervention efforts have taken center stage, to test models and methods for promoting resilience.

As a result of this transformation, the importance of global perspectives, knowledge, and research on resilience has surged. Developmental science has much to gain and much to contribute to a new phase of global science on resilience.

Why Is Global Research on Resilience Important for Developmental Science?

Global research on resilience in human development has the potential to contribute to developmental

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science in multiple ways. First, research in more diverse cultural, political, and geographic contexts expands the evidence base on developmental processes and the full range of adaptive processes involved in resilience. Second, challenges posed by multicultural or multinational contexts can drive innovation in design and methodology, as well as theory. Research in remote or low-technology contexts, for example, has motivated the development of practical methods for assessment of behavioral and biological variables in the field. Third, research on resilience can challenge theory and provoke important refinements. The research on temperament and survival in the Masai study by deVries (1984) challenged the notion of "easy temperament" (and, by implication, any single personality trait) as a universal protective factor. Similarly, the recent research on youth engaged in political violence has challenged the idea that high exposure to adversity erodes well-being (Barber, 2009; Tol, Song, & Jordans, 2013). Global research also offers opportunities for natural and planned experiments on issues of international significance, such as protecting children and promoting recovery in the contexts of natural or technological disasters or violent political conflicts. Fourth, global resilience science informs intervention design, through successes and failures of efforts to deliberately promote resilience in different cultures and situational contexts. Adapting evidence-based practices created in one sociocultural context for application in another context can generate knowledge about the robustness as well as the limitations of an intervention. Lessons are beginning to accumulate on trauma-focused interventions suitable for implementation after mass-trauma events with children and families (e.g., La Greca & Silverman, 2009).

Globalization of resilience science also has the potential to increase appreciation for the value of developmental science across sectors, sciences, and cultures. Research on resilience in children has a compelling rationale and the translational utility often is readily apparent (Masten, 2011), generating interest in the science to find out what may be helpful in reducing exposure or harm and promoting positive adaptation and development.

Why Is Developmental Science Important for Global Resilience?

A reciprocal case can be made for the value of developmental science with respect to global resilience. The scope of endangered children in the world and the stakes for families, cultures, and societies are enormous. There is a need for more knowledge about risk and protective processes and how to prepare for specific threats to human development in the event of exposures to disaster, terror, displacement, abandonment, and many other extremely dangerous situations for child development. International agencies are requesting knowledge and guidance about the best ways to invest their resources; there is growing interest in moving beyond survival goals to promoting healthy development and resilience in children and adolescents (Britto, Engle, & Super, 2013; Diers, 2013; Shonkoff et al., 2012). Global economic agencies like the World Bank are investing in children as a key strategy for promoting the economic future of nations as well as individuals, again with a strong emphasis on resilience (Lundberg & Wuermli, 2012).

UNICEF is the custodian and champion of the UN Convention on the Rights of the Child (UNCRC) which calls on all nations to protect and foster the rights of children to survival, development, protection, and participation (Diers, 2013). The UNCRC requires special efforts to protect children in "especially difficult circumstances," including child labor, sexual exploitation, and armed conflict. UNICEF and other international agencies also are focused on resilience in the context of promoting peace through work with children. For example, UNICEF's Peacebuilding, Education and Advocacy in Conflict-affected Countries program for 2012 through 2015 includes the goal of increasing "capacity of children, parents, teachers and other duty-bearers to prevent, reduce, and cope with conflict and promote peace" (UNICEF, 2013).

SRCD has responded to the growing interest and urgency for global developmental science in multiple ways. The 2005 strategic plan encourages global engagement: The mission statement calls for interdisciplinary research in diverse contexts and states that SRCD "fosters the exchange of information among scientists and research consumers worldwide." One of the five strategic goals states that "SRCD will incorporate international perspectives in its organization, activities, and membership. "Implementing the strategic plan, SRCD has sponsored a series of preconferences at the biennial meeting with a global research focus, including one on immigrant youth in 2011 and a second in 2013 on interventions for children and youth in low- and middle-income countries. SRCD fosters engagement of international young scholars through travel awards

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and speakers from many different countries and regions of the world at conferences. In addition, SRCD sponsors meetings on international themes through grants, such as the 2014 special topic meeting in Prague on "Positive Youth Development in the Context of the Global Recession."

SRCD also features international research in its journals and books. In 2010, for example, there was a special section of this journal on Children in War and Disaster (Masten & Osofsky, 2010). In collaboration with UNICEF, the Society cosponsored the publication of the *Handbook of Early Childhood Development Research and Its Impact on Global Policy* (Britto et al., 2013). These publications have been further disseminated through briefs and briefings organized by SRCD's Office for Policy and Communications in Washington, DC.

The Society also played a key role in support of the newly forming International Consortium of Developmental Science Societies. This consortium includes representatives from leading international research societies, with goals of advancing developmental science and its applications for the enhancement of global health and well-being over the life course. SRCD helped facilitate the initial planning meeting for this consortium, hosted in December 2012, by the Jacobs Foundation at Schloss Marbach, in Germany.

A Call to Global Engagement for Developmental Scientists

The time is ripe for developmental scientists to engage in global activities that foster the well-being and resilience of children. Governmental and nongovernmental organizations around the world, as well as first responders, educators, and other scientists who study human adaptation and resilience, are seeking knowledge, guidance, and partners. We, as developmental scientists, can answer the call. We can show up, bring the best evidence available, and learn to communicate our science across fields and sectors and cultures. We can engage young scholars in these activities to nurture their future engagement as developmental scientists in these collaborative global endeavors. Engaged developmental scientists are not only good for developmental science and its applications in practice or policy, but ultimately important for improving the well-being of children globally and, with these investments, the future well-being of global health and human development.

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